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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	**Application No.** 10/782,928	**Applicant(s)** UEHARA ET AL.	
	Examiner AUDREY Y. CHANG	**Art Unit** 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _03 October 2011_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) _1-5,11-15,26,28,30-32 and 34-38_ is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) _1-5, 11-15, 26, 28, 30-32 and 34-38_ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on October 3, 2011, which has been entered into the file.
- By this amendment, the applicant has amended claim 1.
- Claims 1-5, 11-15, 26, 28, 30-32, and 34-38 remain pending in this application.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 1-5, 11-15, 26, 28, 30-32 and 34-38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.** The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification completely fails to teach how could the three dimensional display is capable of facilitating the display to have "number of pixels per sections per inch (X)" to have the relationship of X>=25.4/D*tan(1'). This means that the pixel separation of the display is **less than** the minimum resolution angle of normal eyesight for human being. This means the images present by the pixels are all fused together that cannot be viewed or resolved by human eye. This means no image can be seen. The specification simply states that the "number of pixels per section per inch" is **set to** have the above motioned relationship, without any physical base or any working example that back up the claim and demonstrating the working of the relationship. This makes the claims non-enabling.

The specification also fails to teach why would the three dimensional display is only working for the display that has "number of pixels per sections per inch (X)" to satisfy the relationship above and not for the display that has lower definition and that has image resolution that can be resolved by the normal human eyesight. It is not clear if the three dimensional display is intended for human viewing or not. If it is for human viewing why the separation of the pixels would be smaller than that human eye can resolve.

Please see the response in the section of "Response to Arguments".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 11-13, 14, 30, 32, 34, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Ichinose et al (PN. 4,987,487) in view of patent issued to Hebiguchi et al (PN.7,301,517)

Ichinose et al teaches a stereoscopic or *three-dimensional image display device* that is comprised of a *display panel* (51, Figures 8-9 or 100 Figures 10-11) wherein a plurality of pixels sections including pixels displaying an image for right eyes and pixels displaying an image for left eye arranged in matrix form and *periodically* arranged in horizontal direction, (51-a1, 51-b1 etc. in Figures 8-9 or LLRR in Figures 10-11). The image display device further comprises *a lenticular lens*, serves as the *optical unit* that directs light emitted from the pixels displaying said image. It is implicitly true that a three-dimensional or stereoscopic visible region is *inherently* defined by placing the midpoint between a viewer's right and left eyes in the visible range such that the image light emitted from the pixels for

displaying the right image will incident and then be viewed by the right eye of the observer and the image light emitted from the pixels for display the left image will incident and then be viewed by the left eye of the observer, (please see Figure 9 illustrates the visible range for the three-dimensional viewing). **Ichinose** et al teaches that the normal distance between the midpoint of the *eyes* to the *lenticular lens* or the optical unit is D and the distance between the *display panel* and the optical unit is f' (i.e. the focal length of the lenticular length). The actual distance between the midpoint of the eyes and the display panel therefore equals D"= D+ f'. It is also implicitly true that there is a **most** distant point with distance D' (with D'>D"=D+f') between the midpoint of the eyes and the display panel within the three-dimensional visible region for allowing the stereoscopic image to be viewable by the observer.

As demonstrated by Figure 8, the *smallest* separation between two adjacent image pixel sections that can be *resolved* by the eyes so that one image from the first pixel section to be directed to left eye and the other image from the adjacent second pixel section to the right eye is indicated in **Figure 8** as *L*. **And the definition of the pixel section is defined as 1/*L*.** From simple geometry one can calculate the definition of the pixel section as the following:

Assuming the *angular separation* between the image lights from the two adjacent pixel sections is an angle "*a*" and the angular separation of the image light after passing through the optical unit or lenticular lens is an angle *b*. Then the following condition can be established:

L/f'= tan (*a*) and e/D= tan (*b*). "e" being the separation distance between two eyes and D is the observation distance, (between the lenticular lens and the midpoint of the eyes, please see the Figure 8 of Ichinose et al for the demonstration of "L", "f'", "D" and "e").

The **actual** distance between the midpoint of the two eyes and the display panel is D", and the distance between the **most** distant point in the three dimensional visible range and the display panel is D', and they are related as follows:

D"= D + f' and D'> D".

One can then get the following conditions:

L+ e = (f' * tan (*a*)) + (D * tan (*b*)), for paraxial light, angle *b*= angle *a*. This means tan (*a*) equals tan (*b*). (If the optical unit is a *parallax barrier* with slits instead of the lenticular lens, the angle *a* will be equal to angle *b*, neglecting the refractivity of the lenticular lens.)

This means the following:

(*L*+ e) approximately equals (f' +D)* tan (*a*), which then equals to D"* tan (*a*). This means

L < D" **tan (*a*)< D'** tan(a), or 1/*L*> 1/(D"* tan (*a*))> 1/(D'*tan(a)), with the conversion factor between millimeter to inch (i.e. 25.4 millimeter per inch), **1/*L* > 25.4/(D"* tan (*a*)) (dpi).** Similarly ***L* <** D'* tan (*a*), (i.e. distance measured from display panel to the **most** distant point in the visible range), and **1/L>25.4/(D'*tan(a))(dpi).**

This means **1/*L*> 25.4/(DIS* tan (*a*)) (dpi).** By setting the distance in the normal direction of the observer to the display panel to be **DIS, wherein DIS is between D' and D" or is the most distance D' .** The **definition** of the pixel section (1/*L*) therefore is defined with respect to the angular separation of the image light from the adjacent pixel section. This reference however does not teach explicitly to have the definition to satisfy the cited equation "X>25.4/(D*tan(1'))" . The claims however also do not teach the meaning of "tan(1')", it can only be examined in the broadest interpretation. It is known in the art that **normal** or **general eyesight for human being** is 1.0, which means the *minimum* angular separation, is 1/60 degree or one minute. This leads to if the angular separation "a" assumes the value 1/60 degree or one minute, it gives the minimum value for the definition. This means the **definition** is **1/*L* >= 25.4/(D'* tan (1'))(dpi). 1/L is the "number of pixels sections per inch" as "X" defined in the claim.**

Furthermore, Hebiguchi et al in the same field of endeavor teaches a standard liquid crystal display apparatus that has a pixel pitch of 200 pixels per inch, (ppi or dpi, please see column 2, lines 29-30). For the standard viewing distance 500 mm, **25.4/(D*tan(1'))** is about 174.7. This means 200 dpi is greater than 174.7 or the value determined by expression. It would then have been obvious to one skilled

in the art to utilize a standard liquid crystal display having a number of pixel per inch of 200 dpi which is greater than **25.4/(D*tan(1')),** for the benefit of using a standard liquid crystal display device with desired of resolution to provide the stereoscopic display.

With regard to claim 3, Ichinose et al teaches that the display device having this display panel could be a liquid crystal display device, (please see column 2, line 5 or column 5, lines 38-40).

With regard to claim 11, Ichinose et al teaches the image display device is intended for displaying three-dimensional images taken from photographs and being processed by a computer, (please see 3). However it does not specify that it is movie picture. But the application of such display apparatus to display movie pictures would have been obvious to one skilled in the art since it involves only feed in movie pictures to the computer for processing, and such modification has the advantage of displaying three dimensional movie pictures.

With regard to claims 12-13, this reference also does not teach explicitly that the display apparatus is applied to different portable devices. However since Ichinose et al does teach that the display device includes liquid crystal display and it is known in the art that liquid crystal display device is widely applied in many portable visual devices, such modifications would have been obvious to one skilled in the art to allow this stereoscopic image display device be applied in different *portable* device for providing portable 3D views. It also has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Madham, 2 USPQ2d 1647 (1987).

With regard to claim 30, Ichinose et al teaches these equations or relationships explicitly. As illustrated in Figures 9 and 10, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β. Then the following condition can be established, based on geometric and trigonometric theorem:

$L/f' = L/H = \tan(\alpha)$, this means $L = H * \tan(\alpha)$,

e/D (D is the same as D-H in the claim) = $\tan(\beta)$, this means $(D-H) * \tan(\beta) = e$,

and $n*\sin(\alpha) = \sin(\beta)$.

"2L" being the pitch of a pixel section, "e" being the separation distance between two eyes, f' being the distance between the lenticular and the pixel section (i.e. same as H, i.e. f'=H), and D is the distance between the lenticular lens and the eyes, (i.e. same as D-H, in the claim). It is noted that the lenticular lens can be attached next to the pixel section as shown in Figure 10, such that the Snell's law satisfies, $n*\sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

With regard to amended claims 32 and 38, the equation "X>=25.4/(D*tan(1'))" is met by the teachings of Ichinose et al for the same reasons as explicitly stated for claim 1 above. As for the feature "X:Y=2:1", the instant application fails to give explicit support for this feature. However since these definitions are determined by the observation distance, and are appeared to be *design factors* for achieving optimal viewing condition for the display device.

With regard to claim 37, Ichinose et al teaches that the display device is for achieving three dimensional image display.

With regard to claim 34, Ichinose et al teaches that the display device having this display panel could be a liquid crystal display device, (please see column 2, line 5 or column 5, lines 38-40).

With regard to claim 36, Ichinose et al teaches that the optical unit is a lenticular lens arranged on the viewer side of the display panel with a plurality of cylindrical lenses arranged for each row of the pixels section and extended along an extending direction of the row, (please see Figure 1).

5. **Claims 2, 4, and 15, 26, 28, 31 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichinose et al and Hebiguchi et al as applied to claims 1, 14 and 32 above, and further in view of the patent issued to Isono et al (PN. 5,315,377).**

The method and apparatus for outputting image for stereoscopic vision taught by **Ichinose et al and Hebiguchi et al** as described for claims 1, 14 and 32 above has met all the limitations of the claims.

With regard to claims 2 and 15, this reference does not teach explicitly about the definition of the pixel section in vertical direction of the pixels matrix. **With regard to claims 4 and newly submitted claim 35**, this reference also does not teach explicitly that the optical unit can be parallax barriers with a plurality of slits. **Isono** et al in the same field of endeavor teaches a three-dimensional image display wherein a *parallax barrier* having a plurality of slits (Figures 2, 4 and 8A), that is aligned with the matrix arrangement of the pixels (Figures 8B and 9) is used to provide the three-dimensional image display. It is implicitly true for square or rectangular type of pixel section, the **same definition analysis disclosed above** also applies for the **vertical** direction of the matrix to allow the image being resolved by the eyes of the observer to achieve stereoscopic viewing. It would then have been obvious to one skilled in the art to apply the teachings of **Isono** et al to modify the display apparatus of **Ichinose** et al to use parallax barrier, an electronic one as disclosed by Isono et al, as alternative means to achieve the stereoscopic image display for the benefit of allowing different design and control, (the electronic driven parallax barrier has the advantage of controlling the slit size), that suited for different application to achieve the stereoscopic image viewing.

Claim 2 recites phrase that "*a number of pixels sections per inch in the horizontal direction is configured such that a resolution of the image in the horizontal direction as projected in the three-dimensional visible range is no less than the resolution by the eyesight of a viewer whose midpoint between the right eye and the left eye is positioned in the three-dimensional visible rang".* This feature is **implicitly** met since the three-dimensional image is observed by the observer when the observer placing his eyes within the three-dimensional visible range, (i.e. the left eye image and right eye image are resolved and projected to the left eye and right eye respectively). The pixel definition (i.e. pixel per inch), has to be greater than resolution of the eyesight in order for the image to be able to be viewed.

Furthermore, as explicitly stated about the definition of the display has the expression **$1/L >= 25.4/(D' * \tan(1'))$(dpi)**. This means the number of the pixels per inch is no less than the resolution of the eyesight.

With regard to claim 31, Ichinose et al teaches these equations or relationships explicitly. As illustrated in Figures 9 and 10, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β. Then the following condition can be established:

$L/f' = L/H = \tan(\alpha)$, this means $L = H * \tan(\alpha)$,

e/D (D is the same as D-H in the claim) = $\tan(\beta)$, this means $(D-H) * \tan(\beta) = e$,

and $n * \sin(\alpha) = \sin(\beta)$.

"2L" being the pitch of a pixel section, "e" being the separation distance between two eyes, f' being the distance between the lenticular and the pixel section (i.e. same as H, i.e. f'=H), and D is the distance between the lenticular lens and the eyes, (i.e. same as D-H, in the claim). It is noted that the lenticular lens can be attached next to the pixel section as shown in Figure 10, such that the Snell's law satisfies, $n*\sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ichinose et al and Hebiguchi et al as applied to claim 1 above, and further in view of the patent issued to Chikazawa (PN. 5,852,512).

The method and apparatus for outputting image for stereoscopic vision taught by **Ichinose et al and Hebiguchi et al** as described for claim 1, above have met all the limitations of the claims. Ichinose et al teaches the optical unit is a *lenticular* lens having a plurality of cylindrical lenses. However it does not teach explicitly that the cylindrical lenses are arranged periodically in the horizontal direction and extended in the vertical direction. But it is true that the lenticular lenses of Ichinose et al are arranged periodically in the horizontal direction. And it is implicitly true that the lenticular lens is extended in a

perpendicular direction with respect to the periodical direction as explicitly demonstrated by the teachings of **Chikazawa**. **Chikazawa** in the same field of endeavor teaches a lenticular lens having a plurality of cylindrical lenses that are arranged along the horizontal direction of the pixels and extended in the vertical direction. It would have been obvious to one skilled in the art to make the lenticular lens has this geometric arrangement for the benefit of providing horizontal parallax to allow stereoscopic vision.

7. Claims 1, 3, 11-14, and 30 and newly submitted claims 32-34 and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Momochi (PN. 5,528,420) in view the patent issued to Ichinose et al (PN. 4,987,487) and Hebiguchi et al (PN. 7,301,517).

Momochi teaches a *method* and *apparatus* for outputting image for stereoscopic vision wherein the apparatus comprises a display panel having a *plurality of pixels* forming pixel sections wherein the plurality of pixels displaying image for the right eye and image for the left eye respectively, and the pixels has a *matrix* form, (please see Figures 4 and 5) and are arranged *periodically* in horizontal direction. The apparatus further comprises an *optical unit*, such as a *lenticular lens*, for re-emitting image light from the display panel to *right eye and left eye of an observer*, respectively, (please see Figures 6-8). It is implicitly true that a three-dimensional or stereoscopic visible region is inherently defined by placing the midpoint between a viewer's right and left eyes in the visible range such that the image light emitted from the pixels for displaying the right image will incident and then be viewed by the right eye of the observer and the image light emitted from the pixels for display the left image will incident and then be viewed by the left eye of the observer. And it is implicitly true that there is a definite distance (D'), in the *normal direction* with respect to the display panel, between the *most* distant point in the three-dimensional visible range and the display panel and there is a definite distance (D"), in the normal direction with respect to the display panel, between the *midpoint* of the two eyes of the observer and the display panel.

As demonstrated by the Figure 7, the distance D", measured from the midpoint of the two eyes to the display panel, should equal to D (observation distance) *plus* (n*f). The symbol "n" means refractive index of the lenticular lens and "f" means the focal length of the lens. The *smallest* separation between two adjacent image pixel sections that can be *resolved* by the eyes so that one image from the first pixel section to be directed to left eye and the other image from the adjacent second pixel section to the right eye is indicated in Figure 7 as Δ. And the definition of the pixel section is defined as 1/Δ. From simple geometry one can calculate the definition of the pixel section as the following:

Assuming the *angular separation* between the image lights from the two adjacent pixel sections is angle *a* and the angular separation of the image light after passing through the optical unit or lenticular lens is angle *b*. Then the following condition can be established:

Δ/n*f = tan (*a*) and W/D= tan (*b*). W being the separation distance between two eyes and D is the observation distance, (i.e. the distance between the midpoint of the eyes and the lenticular lens).

The actual distance between the midpoint of the two eyes and the *display* panel (D") and the actual distance between the **most** distant point in the three dimensional visible range and the display panel (D') have relative relationships defined as follows:

D"= D + n*f and D'> D".

One can then get the following conditions:

Δ+ W = (n*f) tan (*a*) + D tan (*b*), for paraxial light, *b*=n**a*, and tan (*a*) approximately equals to *a* in radians and tan (*b*) approximately equals to *b* in radians. This means n*tan (*a*) = n**a* =*b*= tan (*b*), for angle *a, b* being small. This means the following:

D" = D + n*f = Δ/tan(*a*) + W/tan(*b*) = (Δ+W/n)/tan(*a*) or D" tan(*a*)= (Δ+W/n),

This means Δ < D" *tan (*a*)<D' *tan(*a*), or 1/Δ> 1/(D"* tan (a))> 1/(D'*tan(a)), with the conversion factor between millimeter to inch (i.e. 25.4 millimeter per inch), **1/Δ> 25.4/(D"* tan (*a*))**

(dpi). Similarly $\Delta < D'* \tan(a)$, (i.e. distance measured from display panel to the most distant point in the visible range), and **$1/\Delta > 25.4/(D'* \tan(a))$ (dpi).**

This means **$1/\Delta > 25.4/(DIS* \tan(a))$ (dpi).** By setting the distance in the normal direction of the observer to the display panel to be **DIS, wherein DIS is between D' and D" or be at the most distant point D'.** The **definition** of the pixel section ($1/\Delta$) therefore is defined with respect to the angular separation of the image light from the adjacent pixel section. This reference however does not teach explicitly that the equation for definition is of the form recited in the claims. But the claims also fail to give meaning for the claimed equation such feature can only be examined in the broadest interpretation. It is known in the art that normal or general eyesight for a human being is 1.0, which means the minimum angular separation, is 1/60 degree or one minute. This leads to if the angular separation angle a is set to be at least 1/60 degrees or one minute, i.e. the minimal angular separation, it gives a minimum value for the definition. This means the **definition** is **$1/\Delta >= 25.4/(D''* \tan(1'))$ (dpi), where the angle "a" is 1 minute. $1/\Delta$ is the "number of pixels section per inch" same as "X" of the claim.**

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the pixels of the display device emit the image light. It is known in the art that the geometric relationship between the definition in term of the viewing distance of the observer does not change by whether the fact that the image pixels actually emit the light themselves or the image light reflected from them since the definition is defined by the geometric relationship set forth in above, (the applicant is noted nowhere in the mathematical deduction above does the fact of the origin of the image light come in to become a determining factor). Furthermore, it is well known in the art to use display device such as liquid crystal display device to provide the display panel having plurality of pixels sections and optical unit that emits the image light emitted from the liquid crystal display device to provide the stereoscopic image display as demonstrated by **Ichinose** et al. **Ichinose** et al teaches explicitly about same geometric relationship between the image definition and the observation viewing distance, (please

see Figures 8-9). It would then have been obvious to one skilled in the art to apply the teachings of Ichinose et al to use liquid crystal display device as the display panel for the benefit of allowing the stereoscopic image display arrangement of **Momochi** be applied to a variety of display device utilizing liquid crystal display device such as television, video game device or computer.

Furthermore, Hebiguchi et al in the same field of endeavor teaches a standard liquid crystal display apparatus that has a pixel pitch of 200 pixels per inch, (ppi or dpi, please see column 2, lines 29-30). For the standard viewing distance 500 mm, **25.4/(D*tan(1'))** is about 174.7. This means 200 dpi is greater than 174.7 or the value determined by expression. It would then have been obvious to one skilled in the art to utilize a standard liquid crystal display having a number of pixel per inch of 200 dpi which is greater than **25.4/(D*tan(1'),** for the benefit of using a standard liquid crystal display device with desired of resolution to provide the stereoscopic display.

With regard to claim 3, Ichinose et al teaches explicitly that the display device having this display panel could be a liquid crystal display device, (please see column 2, line 5 or column 5, lines 38-40).

With regard to claim 11, Momochi teaches the image display device is intended for displaying three-dimensional images taken from photographs and being processed by a computer, (please see 3). However it does not specify that it is movie picture. But the application of such display apparatus to display movie pictures would have been obvious to one skilled in the art since it involves only feed in movie pictures to the computer for processing, and such modification has the advantage of displaying three dimensional movie pictures.

With regard to claims 12-13, this reference also does not teach explicitly that the display apparatus is applied to different portable devices. However it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Madham, 2 USPQ2d 1647 (1987).

With regard claim 30, Momochi et al teaches these equations or relationships explicitly. As illustrated in Figure 6, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β. Then the following condition can be established:

Δ/nf = Δ/H= tan (α), this means Δ = H* tan (α),

W/D= tan (β), this means W (or e) = D* tan (β),

n *sin(α) = sin (β).

"2Δ" being the pitch of a pixel section, "W" being the separation distance between two eyes, (i.e. the same as "e"), nf being the distance between the lenticular and the pixel section (i.e. same as H), and D is the distance between the lenticular lens and the eyes, (i.e. same as D-H, in the claim). It is noted that the Snell's law satisfies, n*sin(α) = sin (β), with n being refractive index of the lenticular lens.

With regard to amended claims 32 and 38, the equation "X>=25.4/(D*tan(1'))" is met by the teachings of Ichinose et al for the same reasons as explicitly stated for claim 1 above. As for the feature "X:Y=2:1", the instant application fails to give explicit support for this feature. However since these definitions are determined by the observation distance, and are appeared to be design factors for achieving optimal viewing condition for the display device.

With regard to claim 37, Ichinose et al teaches that the display device is for achieving three dimensional image display.

With regard to claim 34, Ichinose teaches that the display device having this display panel could be a liquid crystal display device, (please see column 2, line 5 or column 5, lines 38-40).

With regard to claim 36, Ichinose et al teaches that the optical unit is a lenticular lens arranged on the viewer side of the display panel with a plurality of cylindrical lenses arranged for each row of the pixels section and extended along an extending direction of the row, (please see Figure 1).

8. **Claims 2, 4, 15, 26, 28, 31 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Momochi , Ichinose et al and Hebiguchi et al as applied to claims 1, 14 and 32 above, and further in view of the patent issued to Isono et al (PN. 5,315,377).**

The method and apparatus for outputting image for stereoscopic vision taught by **Momochi in view of the teachings of Ichinose et al and Hebiguchi et al** as described for claims 1 and 14, above have met all the limitations of the claims. With regard to claims 2 and 15, this reference does not teach explicitly about the definition of the pixel section in a second direction of the pixels matrix. **With regard to claim 4 and newly added claim 35,** this reference also does not teach explicitly that the optical unit can be a parallax barrier with a plurality of slits. **Isono** et al in the same field of endeavor teach a three-dimensional image display wherein a *parallax barrier* having a plurality of slits (Figures 2, 4 and 8A), that is aligned with the matrix arrangement of the pixels (Figures 8B and 9) is used to provide the three-dimensional image display. It is implicitly true for square or rectangular type of pixel section, ***the same definition analysis*** disclosed above also applies for the vertical direction of the matrix to allow the image being resolved by the eyes of the observer to achieve stereoscopic viewing. It would then have been obvious to one skilled in the art to apply the teachings of Isono et al to modify the display apparatus of Momochi to use parallax barrier, an electronic one as disclosed by Isono et al, as alternative means to achieve the stereoscopic image display for the benefit of allowing different design and control, (the electronic driven parallax barrier has the advantage of controlling the slit size), that suited for different application to achieve the stereoscopic image viewing.

Claim 2 recites the phrase that "*a number of pixels sections per inch in the horizontal direction is configured such that a resolution of the image in the horizontal direction as projected in the three-dimensional visible range is no less than the resolution by the eyesight of a viewer whose midpoint between the right eye and the left eye is positioned in the three-dimensional visible rang".* This feature is **implicitly** met since the three-dimensional image is observed by the observer when the observer placing

his eyes within the three-dimensional visible range, (i.e. the left eye image and right eye image are resolved and projected to the left eye and right eye respectively). The pixel definition (i.e. pixel per inch), has to be greater than resolution of the eyesight in order for the image to be able to be viewed. Furthermore, as explicitly stated about the definition of the display has expression **$1/L$ > =25.4/(D'* tan (1'))(dpi).** This means the number of the pixels per inch is no less than the resolution of the eyesight.

With regard to newly added claim 31, Momochi et al teaches these equations or relationships explicitly. As illustrated in **Figure 6**, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β. Then the following condition can be established based on the geometry and trigonometry theorem:

$\Delta/nf = \Delta/H = \tan(\alpha)$, this means $\Delta = H^* \tan(\alpha)$,

$W/D = \tan(\beta)$, this means W (or e) = $D^* \tan(\beta)$,

$n^*\sin(\alpha) = \sin(\beta)$.

"2Δ" being the pitch of a pixel section, "W" being the separation distance between two eyes, (i.e. the same as "e"), nf being the distance between the lenticular and the pixel section (i.e. same as H), and D is the distance between the lenticular lens and the eyes, (i.e. same as D-H, in the claim). It is noted that the Snell's law satisfies, $n^*\sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Momochi, Ichinose et al as and Hebiguchi et al as applied to claim 1 above, and further in view of the patent issued to Chikazawa (PN. 5,852,512).

The method and apparatus for outputting image for stereoscopic vision taught by **Momochi in view of the teachings of Ichinose et al and Hebiguchi et al** as described for claim 1 above have met all the limitations of the claims. Momochi teaches the optical unit is a *lenticular* lens having a plurality of

cylindrical lenses. However it does not teach explicitly that the cylindrical lenses are arranged periodically in the horizontal direction and extended in the vertical direction. But it is true that the lenticular lens of Momochi is arranged periodically in the horizontal direction. And it is implicitly true that the lenticular lens is extended in a perpendicular direction with respect to the periodical direction as explicitly demonstrated by the teachings of **Chikazawa**. **Chikazawa** in the same field of endeavor teaches a lenticular lens having a plurality of cylindrical lenses that are arranged along the horizontal direction of the pixels and extended in the vertical direction. It would have been obvious to one skilled in the art to make the lenticular lens has this geometric arrangement for the benefit of providing horizontal parallax to allow stereoscopic vision.

Response to Arguments

10. Applicant's arguments filed on October 3, 2011 have been fully considered but they are not persuasive. The newly amended claims have been fully considered and they are rejected for the reasons stated above.

11. In response to applicant's arguments provided in page 2 of the remark, the resolution shown by the figure is NOT the same as claimed in the claims. The arguments therefore are not persuasive to overcome the rejections.

12. In response to applicant's arguments concerning the pixel separation or "number of pixels section per inch" can be less than minimum resolution angle of normal eyesight since the image for recognition is represent by a *plurality of pixels* not a single pixel, so no eyesight resolution is required for the single pixel. If this is the case, then theoretically "the number of pixels section per inch" can assume any number and any physical display device has the highest number can be used, since it has nothing to do with the enable of viewing the three dimensional image. It also has nothing to do with the viewing distance and the normal eyesight. It is really not clear how the "number of pixels section per inch" be

determined by the claimed equations. The applicant is respectfully noted that since the specification simply states that the "number of pixels section per inch" is "**SET**" to satisfy the relationship "X>=25.4/D*tan(1')" (please see paragraphs [0015] and [0016]), this means that the definition of the display is arbitrarily **set** or selected. The specification completely fails to give any example numerical values for making the three dimensional display system operable. The only physical value that is available is the viewing distance. The cited Ichinose reference teaches an example for possible display device, but NOT limited to this example only, with the pixel separation of 0.2 mm that is correspond to 127 DPI, and as stated by the applicant that the 127 DPI is for viewing at 700 mm. This means it is possible to, since the cited Ichinose reference teaches equations, rather than just numerical values for the design of the display system, it is within general skill level of ordinary worker in the art to facilitate the three dimensional display system by the disclosed equations. The applicant argues that at 500 mm viewing distance the DPI for the display has to be 175 DPI, the applicant being one skilled in the art must understand **standard liquid crystal display with 200 DPI is well known in the art** as taught by **Hebiguchi** et al (PN. 7,301,517). The applicant is respectfully noted that the three dimensional display system has exactly the same arrangement as of the cited Ichinose and Momochi references. If the three dimensional display system of the instant application can include display with the definition or the number of pixel section per inch satisfies the equation claimed then the stereoscopic system of Ichinose and Momochi **have to** also satisfy the relationship, since they have exactly the same set up and same geometry relationship between the viewer, the display and the optical unit (such as the lenticular lens). The issue concerning using what type of display becomes an intended use issue and obvious matters of design issue.

The applicant's arguments really fails to give an acceptable arguments as how the number of pixels section per inch "X" is determined by the claimed equation, since applicant seems to argue that "X" really has nothing to do with the eyesight resolution for viewing 3D image. And in light

of the various arguments provided by the applicant, it appears that "X" is a design factor and since display panel with 200 dpi is known in the art, it appears the feature is really an obvious matter of design choice to one skilled in the art to use a display panel with desired dpi to provide image with higher resolution. Using art well known display panel in a standard stereoscopic display device really has no patentable feature.

13. The applicant is respectfully noted that the instant application only discloses an **ordinary** stereoscopic image display utilizing a lenticular lens disposed in front of a display device with a plurality of pixels for displaying right eye and left eye. The claimed *arrangement* is extremely well known in the art and what are being claimed is simply drawn to viewing conditions or optimal viewing conditions to operate the display device. The conditions are purely based on and guided by the limitations of the human eye and can be determined by simple experimentations by one skilled in the art.

14. In response to applicant's arguments concerning the "minimum angular separation", (1/60 of a degree or one minute), the applicant is respectfully note that the minimum angular separation is based on the structure of a HUMAN eye, that is not based on the distance of viewing. This value is also known to one skilled in the art, and is a design factor for the viewing.

15. In response to applicant's arguments concerning "accommodation and vergence which may cause fatigue", the examiner respectfully wonder since the structure and arrangement of instant application and the cited references are identical, why would the instant application does not cause fatigue while the cited references would? The specification and the arguments fail provide the critical element or structure to support applicant's arguments.

16. In response to applicant's arguments concerning the rejections based on the cited references, the applicant is respectfully noted that the derivations of the equation or relationship claimed in the claims are explicitly stated in the reasons for rejections. Since the structural arrangement of the cited references and

structural arrangement of the instant application are IDENTICAL, the conditions of viewing based on the KNOWN minimal angular separation of human eye are considered to be obvious matters of design choices to one skilled in the art.

17. The applicant's respectfully noted that the specification FAILS to provide the physical and mathematical derivations for the equations claimed. The examiner provides reasonable derivations to the equation. Since the specification *fails* to provide any reasonable derivation to the equation, applicant's speculations concerning examiner's derivation are not persuasive and are without base since the *applicant fails to provide a reasonable derivation for the equation*. Furthermore, the motivation for modification is obvious which to use the known minimal angular separation of human eye to design a stereoscopic display device.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AUDREY Y. CHANG whose telephone number is (571)272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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